EFFICACY REVIEW
2824-1; EPA File Symbol: 400-LEG

DATE:	06/13/06
DP BARCODE:	D328337
GLP:	467611-01.....unknown 467611-02.....unknown 467611-03.....unknown 467611-04.....unknown
CHEMICAL:	Diflubenzuron (36.4%)
CHEMICAL NUMBER:	108201
PURPOSE:	Provide efficacy data to support product registration.
MRID:	46761101. Ross, D. (2001) Report on the Efficacy of an Experimental Diflubenzuron Feed-through Formulation for Controlling Development of Immature Horn Flies, Haematobia *irritans*, in Cattle Feces. Project Number: 425/00/18, 6134/2824/99B/114, 5/00/043/B799/00/04/74. Unpublished study prepared by CALV, Inc. & CRC. 70 p. 46761102. Ross, D. (2001) Report on the Evaluation of the Efficacy of Permectrin CDS Pour-on in Combination with a Feed-through Larvacide for Controlling Populations of Horn Flies, *Haematobia irritans*, and Face Flies, *Musca autumnalis*, on Pastured Beef Cattle. Project Number: 6134/2824/00B/034, 027. Unpublished study prepared by ECTO Development Corp. 22p. 46761103. Ross, D. (2002) Protocol to Determine the Efficacy of an Experimental Diflubenzuron Feed-through Formulation for Controlling Development of Stable Fly, *Stomoxys calcitrans*, and House Fly, *Musca domestica* in Cattle Feces. Project Number: 6134/2824/00B/93. Unpublished study prepared by Kansas State University. 18 p. 46761104. Ross, D. (2002) Report on the Evaluation of the Efficacy of Different Doses of a *Haematobia irritans*, and Face Flies, *Musca autumnalis*, on Pastured Beef Cattle. Project Number: 6134/2824/01B/021. Unpublished study

prepared by ECTO Development Corp. 32 p.

TEAM REVIEWER: Kable Bo Davis

EFFICACY REVIEWER: Kable Bo Davis, M.S., Entomologist 6-13-06

SECONDARY EFFICACY REVIEWER: Joanne S. Edwards, M.S., Entomologist Joanne S. Edwards 6/13/06

BACKGROUND:

2824-1 is an oral larvicide fed to cattle for reducing fly populations. This proposed product contains diflubenzuron and is intended to disrupt the developmental cycle of flies within manure, and is not efficacious against adults. Specific targeted pest species include: face flies (*Musca autumnalis*), horn flies (*Haematobia irritans*), stable flies (*Stomoxys calcitrans*), and house flies (*Musca domestica*). 2824-1 should be fed to cattle at a rate of 12.5 mg of diflubenzuron per 100 lbs. of body weight per day, and should be administered early in the spring and continued throughout fly season, or until cold weather restricts fly flight. Proposed label claims include: "Breaks the fly life cycle", "Prevents the formation of fly larvae's exoskeletons when they molt", and "Can be used as part of an integrated fly control pest management program."

DATA REVIEW:

The following data review is comprised of explanations of materials and methods, and a summation of experimental results containing tables with reformatted data.

46761101. Ross, D. (2001) Report on the Efficacy of an Experimental Diflubenzuron Feed-through Formulation for Controlling Development of Immature Horn Flies, Haematobia *irritans*, in Cattle Feces. Project Number: 425/00/18, 6134/2824/99B/114, 5/00/043/B799/00/04/74. Unpublished study prepared by CALV, Inc. & CRC. 70 p.

The objective of this study was to determine the efficacy of three different doses (0.10, 0.15, and 0.20 mg ai/kg body weight) of an experimental 36.4% diflubenzuron feed-thorough formulation for controlling immature horn flies, *Haematobia irritans*. The experimental design consisted of three treatment groups (one group for each of the three doses), and a control group. A total of three animals were used per group. Animals within each treatment group were individually fed daily, up to day 29. Fecal samples were taken from all cattle on days 1-4, 8-11, 15-18, 22-25, and 29-32, and percent fly emergence was recorded from all treatment groups.

Results:

Table 1. Effect of Diflubenzuron on Horn Fly Adult Emergence

	Group A 0.10 mg/kg	Group B 0.15 mg/kg	Group C 0.20 mg/kg
	% Reduction	% Reduction	% Reduction
Day 1	49.4%	88.9%	85.7%
Day 2	100%	96.7%	100%
Day 11	100%	100%	100%
Day 22	99.7%	100%	100%
Day 31	98.6	100%	100%
Mean	**93.9%**	**97.7%**	**97.9%**

*** ((% emergence control - % emergence treatment) / % emergence control) * 100*

All three diflubenzuron feed-through treatments resulted in an average of from 93.9% to 97.9% reduction in adult horn fly emergence.

46761102. Ross, D. (2001) Report on the Evaluation of the Efficacy of Permectrin CDS Pour-on in Combination with a Feed-through Larvacide for Controlling Populations of Horn Flies, *Haematobia irritans*, and Face Flies, *Musca autumnalis*, on Pastured Beef Cattle. Project Number: 6134/2824/00B/034, 027. Unpublished study prepared by ECTO Development Corp. 22p.

The objective of this study was to determine the efficacy of an experimental 36.4% diflubenzuron feed-through formulation for controlling immature horn flies, *Haematobia irritans*. The experimental design consisted of one treatment group and one control group. Cattle in the treatment group were offered a "free choice" mineral supplement containing the 36.4% diflubenzuron test material, which was targeted for consumption at the rate of 0.1 mg ai/kg body weight/day. Bioassays were conducted using manure collected from treated cattle in each group to determine the average reduction in adult emergence.

Results:

Table 2. Percent Reduction of Adult Horn Fly Emergence

	Diflubenzuron Feed-Through 0.1 mg ai/kg body weight/day
Day 7	81.8%
Day 14	99.3%
Day 28	89.1%
Day 56	32.2%
Day 112	100%
Mean	**77.6%**

*** ((% emergence control - % emergence treatment) / % emergence control) * 100*

The diflubenzuron feed-through treatment resulted in an average of 77.6% reduction in adult horn fly emergence.

46761103. Ross, D. (2002) Protocol to Determine the Efficacy of an Experimental Diflubenzuron Feed-through Formulation for Controlling Development of Stable Fly, *Stomoxys calcitrans*, and House Fly, *Musca domestica* in Cattle Feces. Project Number: 6134/2824/00B/93. Unpublished study prepared by Kansas State University. 18 p.

The objective of this study was to determine the efficacy of three different doses (0.10, 0.15, and 0.20 mg ai/kg body weight) of an experimental 36.4% diflubenzuron feed-thorough formulation for controlling immature stable flies (*Stomoxys calcitrans)* and house flies (*Musca domestica*). The experimental design consisted of three treatment groups (one group for each of the three doses), and a control group. A total of three animals were used per group. Animals within each treatment group were individually fed daily, up to day 29. Fecal samples were taken from all cattle on days 1-4, 8-11, 15-18, 22-25, and 29-32, and percent fly emergence was recorded from all treatment groups.

Results:

Table 3. Percent Reduction of House Fly and Stable Fly Emergence

	Group 1 0.10 mg/kg/day		Group 2 0.15 mg/kg/day		Group 3 0.20 mg/kg/day	
	House Fly	Stable Fly	House Fly	Stable Fly	House Fly	Stable Fly
Day 1	2.73%	100%	77.08%	100%	80.08%	100%
Day 2	87.93%	100%	98.54%	100%	97.81%	100%
Day 11	91.23%	100%	86.18%	100%	94.74%	100%
Day 22	62.5%	100%	66.76%	100%	61.65%	100%
Day 32	15.62%	100%	87.5%	100%	68.75%	100%
Mean	**59.9%**	**86.9%**	**81.6%**	**80.3%**	**76.8%**	**86.9%**

*** ((% emergence control - % emergence treatment) / % emergence control) * 100*

All three diflubenzuron feed-through treatments resulted in an average of from 59.9% to 76.8% reduction in adult house fly emergence and an 80.3% to 86.9% reduction in adult stable fly emergence from treated fecal samples.

46761104. Ross, D. (2002) Report on the Evaluation of the Efficacy of Different Doses of a *Haematobia irritans*, and Face Flies, *Musca autumnalis*, on Pastured Beef Cattle. Project Number: 6134/2824/01B/021. Unpublished study prepared by ECTO Development Corp. 32 p.

The objective of this study was to determine the efficacy of three different doses (0.10, 0.15, and 0.20 mg ai/kg body weight) of an experimental 36.4% diflubenzuron feed-thorough formulation for controlling immature horn flies (*Haematobia irritans)* and face flies (*Musca autumnalis*). The experimental design consisted of four treatment groups (one group for each of the three doses and one group testing the industry standard Rabon). The diflubenzuron formulation was mixed with a mineral supplement and offered "free choice" to cattle on pasture. Bioassays were conducted using manure

collected from treated cattle in each group to determine the average reduction in adult emergence.

Results:

Table 4. Percent Reduction of Horn Fly and Face Fly Emergence

	Group 1 0.1 mg/kg/day**		Group 2 0.15 mg/kg/day**		Group 3 0.2 mg/kg/day**		Group 4 Rabon	
	Horn Fly	Face Fly	Horn Fly	Face Fly	Horn Fly	Face Fly	Horn Fly	Face Fly
Week 1	0%	97%	100%	100%	100%	100%	100%	100%
Week 2	100%	100%	0%	100%	0%	100%	0%	12%
Week 4	100%	28%	100%	74%	94%	85%	0%	100%
Week 8	69%	100%	79%	100%	79%	100%	57%	100%
Week 10	60%	100%	71%	100%	44%	81%	13%	100%
Week 16	33%	72%	31%	100%	39%	67%	26%	100%
Mean	**62%**	**81%**	**62%**	**82%**	**57%**	**89%**	**25%**	**87%**

** ((% emergence control - % emergence treatment) / % emergence control) * 100*

***actual mean consumption was 0.10, 0.13, and 0.21 mg ai/kg body weight/day for groups 1, 2, and 3*

All three diflubenzuron feed-through treatments resulted in an average of from 57% to 62% reduction in adult horn fly emergence and an 81% to 89% reduction in adult face fly emergence from treated fecal samples.

RECOMMENDATIONS:

According to Product Performance Test Guidelines OPPTS 810.3200, the suggested performance standard for fly larvicides to manure is a minimum of 90% reduction in infestation for a period of 2 weeks after treatment. The supported data supports the use of 2824-1 to control the immature stages of stable flies (*Stomoxys calcitrans)*, horn flies (*Haematobia irritans*), and face flies (*Musca autumnalis*) in cattle manure. The following recommendation applies:

1. No data for house flies were submitted. All references to house flies must be deleted from the label. This includes the following label claims:

   "[(Stops) (prevents) development of Horn fly, Face fly, House fly, and Stable fly larvae in manure (of) (from) treated cattle]"

   "[(Stops) (prevents) emergence of adult Horn flies, Face flies, House flies, and Stable flies from manure (of) (from) treated cattle]"